

## EFFECT OF HYPNOTIC AGE REGRESSION ON THE MAGNITUDE OF THE PONZO AND POGGENDORFF ILLUSIONS<sup>1</sup>

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The magnitudes of the Ponzo and Poggendorff illusions among 10 hypnotically age-regressed college students were typical of normative data obtained from young children. This effect was almost complete for the Ponzo but not as pronounced for the Poggendorff illusion. A control group under task motivation instructions failed to produce comparable results. It appears as if age regression facilitates the use or nonuse of visual cues and mechanisms in the manner typical of earlier stages of perceptual development. It is suggested that these illusions may serve as an objective indicator of hypnotic age regression, and that hypnotic age regression may provide a methodological approach to the experimental study of perceptual development.

The use of standard-hypnotic-induction techniques has been reported to facilitate the retrieval of responses, verbal and nonverbal, presumably not emitted for long periods of time. The retrieval of past events by means of hypnosis is usually accomplished by suggesting that *S* is actually the age at which the event is assumed to have occurred. This technique, referred to as "age regression," has been applied to the retrieval of memory for specific events, such as dates (True, 1949), performance on intelligence and projective tests (Mercer & Gibson, 1950; Orne, 1951), physiological responses (Gidro-Frank & Bowersbuch, 1948; Kupper, 1945), and numerous other behaviors reviewed by Barber (1962), Gebhard (1961), and Yates (1961).

According to Barber, the research generated by the concept of age regression may be questioned on methodological grounds (Barber, 1967). The primary criticisms are poor controls and unconvincing dependent variables. Reviews by Gebhard (1961) and Yates (1961), while less critical than Barber, concur in the need for rigor in experimental methodology if the researcher is to establish the validity of age regression.

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An approach to the description and understanding of hypnosis is to identify those responses elicited under hypnosis which cannot easily be made under other kinds of suggestions. If responses can be identified which cannot be made at all under other kinds of suggestions, then in the description of those responses may be found the key to understanding the nature of hypnosis. Specifically, the validity of age regression can be better established when responses typical of children but not of adults are produced under age regression and when these same responses are not produced under a waking suggestion. Of course, the possibility of the validity of age regression is increased if those behaviors at the regressed "age" are in fact similar to the actual responses given by children at that age.

It was recently determined that the Ponzo (Figure 1) and Poggendorff (Figure 2) illusions both vary systematically as a function of age (Leibowitz & Gwozdecki, 1967; Leibowitz & Judisch, 1967). The magnitude of the Ponzo illusion increases with age from childhood through adolescence, approaches an asymptote, and decreases again in old age. The Poggendorff illusion decreases in magnitude with age from 5 to approximately 10 yr., and then remains stable.

The *S*'s responses to these illusions could serve as an adequate indication of the facilitation of retrieval of age-appropriate perceptual responses while age regressed. This would not be a matter of memory, since it is highly

unlikely that most *Ss* were exposed to the specific experimental stimuli at the ages of 5 and 9. In addition, this task seemed especially well suited inasmuch as the age functions of these particular illusions develop in opposite directions. It is virtually certain that *Ss* had no previous knowledge of these normative functions. Therefore, the possibility of acquiescence to expectations is effectively eliminated. The purpose of the present study was to determine whether retrieval of childhood responses to the Ponzo and Poggendorff illusions would be facilitated by age regression by means of a standard-induction technique.

### METHOD

**Subjects.** Undergraduate students from the introductory psychology courses at the Pennsylvania State University, who answered positively to the statement "I would be willing to participate in a hypnosis experiment" were subjected to a standard-hypnotic-induction procedure and then tested on Barber's Suggestibility Scale (BSS, Barber & Glass, 1962). The first 10 students obtaining a score of 8 on the scale were selected for the present experiment. There were 4 females and 6 males. Further selection of 2 female and 3 male *Ss* for a control group was determined by the same procedure. The *Ss* ranged in age from 18 to 21 with a mean of 19.1 yr., and had normal vision either with or without correction.

**Apparatus.** The apparatus and procedure used in this experiment were identical to that used by Leibowitz and Judisch (1967) for the Ponzo illusion and by Leibowitz and Gwozdecki (1967) for the Poggendorff illusion. For the Ponzo illusion, the stimuli consisted of a series of 21 cards similar to the insert in Figure 1, but with the line nearer to the point of convergence varying in length from 2½ to 5 in. in ½-in. steps. The other vertical line was constant in length at 4 in. The Poggendorff figure was made of metal with the right half of the diagonal adjustable (see the insert in Figure 2). The center of the figure was 13 × 4 in. and the diagonal bars were each 7½ × 3½ in. with a 45° angle formed between the center bar and the diagonal bar. Details of the construction of the stimuli are discussed in the original publications.

**Procedure.** Each *S* was presented the stimuli for the Ponzo and Poggendorff illusions under four conditions: no hypnosis, hypnosis-no regression, hypnosis and regression to age 9, and hypnosis and regression to age 5. Only one condition was presented on a given day, at weekly intervals, as determined by random order. In each hypnosis session a standard-induction procedure and the BSS were administered and then the stimuli were presented. The illusion presented first on a given day was randomly determined.

The Ponzo stimuli were presented in a random order, one card at a time, horizontally on a table

before *S* who sat approximately 18 in. from the card. The *S* was given the following instructions: "I am going to show you some cards with lines on them. I want you to point to, or tell me, which of the two vertical lines is longer or bigger." The procedure was adapted from the Leibowitz and Judisch study (1967) which was designed for administration with children. The age-regressed *Ss* were able to follow these instructions without difficulty. After presentation of the first and second cards in the series *E* gave no further instructions and simply recorded *S's* responses without comment. Inasmuch as the order of the cards was random and *E* was uninformed as to the method for determining the equality value, he was naive regarding the significance of *S's* responses for any given card at the time of presentation.<sup>3</sup> The equality value was determined later by interpolation from the transition point at which *S's* response changed.

The *S* was given six trials each session with the Poggendorff apparatus. The right diagonal bar was movable and was set, in an alternating order, significantly out of line above or below the nonmovable, standard left bar. Instructions were given to *S* to "adjust the right-half of the bar so that it seems to be in a straight line with the left bar." The *E* demonstrated how the bar could be moved and *S* was asked if he understood the task. When necessary the instructions were repeated. *S's* line of regard was kept on a vertical plane relative to the center bar of the illusion apparatus.

Between presentation of the Ponzo and Poggendorff illusions, hypnotized *Ss* were asked to close their eyes and the age-regression suggestion was reemphasized. The entire presentation time for both illusions was approximately 15 min. for the hypnosis conditions.

A control group of five *Ss*, selected by the same procedures as the experimental group,<sup>4</sup> were presented the same stimuli under two conditions: (a) routine instructions without any age regression or function suggestion, and (b) task motivation instructions in which they were told "I want you to be five years of age; you are to regress to age five and we will still be able to talk to each other. You can do this for me and I am going to help you do this by asking you some questions." To facilitate the task-motivation instructions, control *Ss* were then presented the same list of questions given to the age-regressed experimental *Ss*. These questions were presented with the suggestion to *S* that "you are now five years old and I want to ask you some questions," and included inquiries about where he lived, places he visited, his birthday party, and his attitudes toward school and playmates. The *S* was also asked

<sup>3</sup> Even though *E* was naive regarding the method for determining the equality value and thus did not know the significance of any single response, he did know whether *S* was age regressed or not. Thus, the possibility of *E* bias has not been completely eliminated.

<sup>4</sup> The *Ss* in both experimental and control conditions were serving in their first hypnosis experiment.

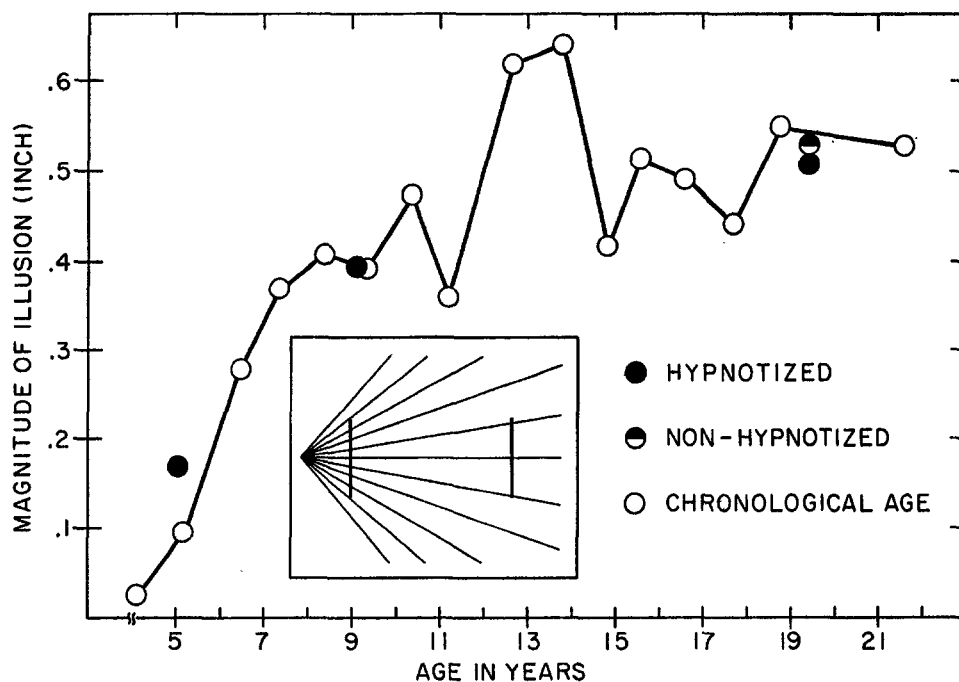


FIG. 1. Ponzo illusion. (The equal vertical lines in the Ponzo illusion (inset) appear unequal. The graph describes the magnitude of this illusion as a function of chronological age, open circles; superimposed are the data obtained under hypnosis, solid circles.) (Reprinted from an article by Michael Parrish, R. M. Lundy, and H. W. Leibowitz published in the March 1968 *Science*. Copyrighted by the American Association for the Advancement of Science, 1968.)

to print his name and to make some numbers. The handwriting samples and the numbers taken from this session and those taken in an earlier *S*-screening session during which these control *Ss* were hypnotized and regressed to age 5 were submitted to a faculty member who was asked to determine if the samples, for a given *S*, were or were not made during the same stage of motor development. The report of the rater that these samples looked like they were made by a "child" during the same period of motor development indicated that *Ss* would write and make numbers when not hypnotized that were as "child-like" as those when they were hypnotized and regressed. This report, considered with the fact that *Ss* were willing to answer questions about events during this fifth year, seems to indicate that these control *Ss* were motivated to cooperate in trying to "be 5 years old." The two control conditions were also presented randomly and separated by 1-wk. intervals.

## RESULTS

**Ponzo illusion.** The magnitude of the illusion was calculated as the difference between the physical equality setting and the subjective equality value interpolated from *S*'s responses. Since the comparison line varied in

$\frac{1}{8}$ -in. steps the interpolation was to the nearest  $\frac{1}{8}$  in. The mean scores and standard deviations for each condition of the present experiment, together with the mean scores for the appropriate age group in the Leibowitz and Judisch (1967) study, are presented in Table 1. To facilitate comparison with the normative data obtained as a function of chronological age (CA), the present results are superimposed on the function obtained in the previous experiment (Figure 1). It will be observed that the data in the absence of age regression, either with or without hypnosis, are similar to those obtained with *Ss* of comparable CA. With regression to age 9, there is a decrease in the magnitude of the illusion which is identical to that obtained with variation of CA. With further regression to age 5, there is a further decrease in the size of the illusion which is not as marked as that obtained with chronological variations.

An analysis of variance leads to a rejection of the hypothesis that the means for the four conditions are equal ( $F = 7.27$ ,  $p < .01$ ). A

TABLE 1

MEAN MAGNITUDE OF PONZO ILLUSION IN INCHES

Data	Conditions			
	No hypnosis	Hypnosis no regression	Hypnosis regressed to 9	Hypnosis regressed to 5
	Mean age of groups			
Present				
<i>M</i>	.53	.51	.39	.17
<i>SD</i>	.11	.16	.13	.16
	19.3	19.3	9.2	5.2
Leibowitz and Judisch				
<i>M</i>	.51	.51	.32	.10
<i>SD</i>	.24	.24	.17	.22

Newman-Keuls procedure (Winer, 1962) was employed to determine which pairs of treatment means differed significantly. Table 2 reveals that, with the exception of the differences between conditions no hypnosis and hypnosis-no regression, all mean differences are significant. This effect and the observed correspondence between the present means and the normative means (Figure 1) suggest

TABLE 2

MATRIX OF DIFFERENCE BETWEEN MEANS OF THE FOUR CONDITIONS FOR THE PONZO ILLUSION

Condition	Hypnosis regressed to 5	Hypnosis regressed to 9	Hypnosis	No hypnosis
Hypnosis regressed to 5		22*	34*	36*
Hypnosis regressed to 9			12*	14*
Hypnosis				2
No-hypnosis				

\* *p* < .05.

strongly that hypnotic induction facilitated the retrieval of the age-appropriate perceptual response to this illusion. The data for the control group obtained under the condition of no task-motivation were also similar to those obtained by Ss of the same CA, being .68 in. Under the task-motivation instructions, the value of the illusion increased to a mean value of .98 in. This value is in the opposite direction from the value obtained for children of age 5 and suggests that the task-motivation condition did not facilitate the retrieval of age-appropriate perceptual responses to this illusion.

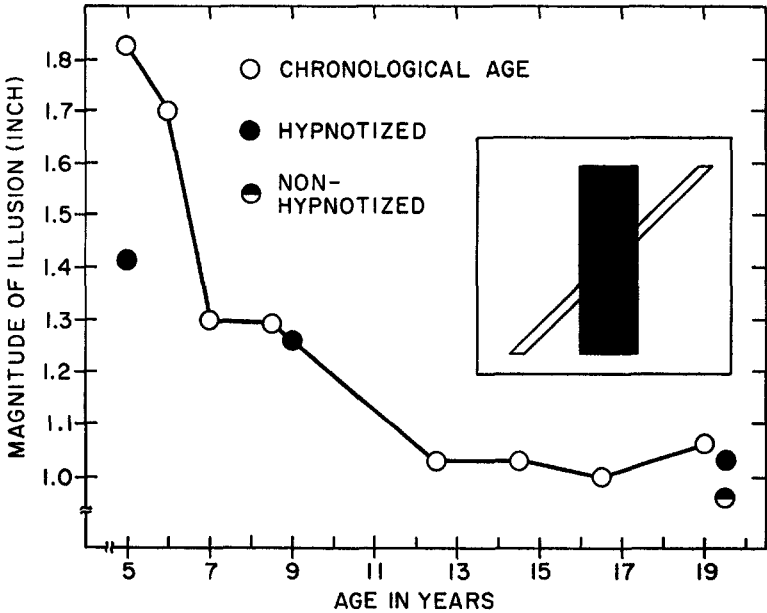


FIG. 2. Poggendorff illusion. (The diagonal line in the Poggendorff illusion (inset) is continuous but appears discontinuous. The graph describes the magnitude of the illusion as a function of chronological age, open circles; superimposed are the data obtained under hypnosis.)

*Poggendorff illusion.* The magnitude of the illusion was calculated as the differences between the physical quality setting and subjective equality value given by *S*. A scale, calibrated in  $\frac{1}{8}$ -in. steps was attached to the back of the center bar. The means for the six trials under each condition are presented in Table 3 and superimposed on the normative data obtained as a function of CA in Figure 2. The magnitudes of the illusion in the absence of age regression and for the 9-yr. age-regression group are essentially identical to those previously obtained, while the data for the 5-yr. group are in the same direction but not as marked as in the previous study.

An analysis of variance leads to a rejection of the hypothesis that the means of the four conditions are all equal ( $F = 4.10$ ,  $p < .05$ ). A Newman-Keuls procedure computed to determine which pairs of the treatment means differed significantly revealed significant differences between the no-hypnosis and hypnosis-regressed-to-age-5 conditions, and between the hypnosis and hypnosis-regressed-to-age-5 conditions (Table 4). The data for the control group obtained under the no-task-motivation condition were similar to those obtained by *Ss* of the same CA, being .94 in. However, for the task-motivation condition the mean value was 1.27 in. which corresponds to the hypnosis-regressed-to-age-9 con-

TABLE 4

MATRIX OF DIFFERENCE BETWEEN MEANS OF THE FOUR CONDITIONS FOR THE POGGENDORFF ILLUSION

Condition	Hypnosis regressed to 5	Hypnosis regressed to 9	Hypnosis	No hypnosis
Hypnosis re- gressed to 5		15	35*	45*
Hypnosis re- gressed to 9			23	30
Hypnosis				7
No-hypnosis				

\*  $p < .05$ .

dition rather than to the hypnosis-regressed-to-age-5 condition.

### DISCUSSION

Reponses to the Ponzo illusion appropriate for children were emitted by young adults while age-regressed. The conclusion that age regression facilitates the use or nonuse of visual cues in a manner appropriate to earlier stages of perceptual development is supported by the correspondence between the present data and the normative data based on CA variation. Further support is provided by the fact that *Ss* given task-motivation instructions were unable to respond in a manner appropriate to 5-yr.-old children. These *Ss* were selected in the same manner as the experimental groups and were presumably as suggestible as the experimental *Ss*. Careful postsession interviews indicated that these *Ss* were surprised to learn that their responses for the task-motivation task were considerably different from those actually obtained from children. Handwriting samples taken while *Ss* were hypnotically regressed to age 5 and while under task-motivation instructions to write as a 5-yr.-old were not noticeably different. This is of interest in that it suggests that *Ss* did attempt to follow the task-motivation instructions. However, further investigation regarding this condition should be undertaken. It is difficult to assess the perceived differences in the regression instructions between *Ss* who have just been given the standard-hypnotic-induction technique and *Ss* who have had no induction instructions, even when the regression instructions are held constant. It would be of interest to

TABLE 3

MEAN MAGNITUDE OF THE POGGENDORFF ILLUSION IN INCHES

Data	Conditions			
	No hypnosis	Hypnosis	Hypnosis regressed to 9	Hypnosis regressed to 5
Present				
<i>M</i>	.96	1.03	1.26	1.41
<i>SD</i>	.39	.32	.38	.24
Mean age of groups				
	19	19	8.5	5
Leibowitz and Gwozdecki				
<i>M</i>	1.06	1.06	1.29	1.83
<i>SD</i>	.38	.38	.36	.36

investigate the parameters of the age-regression instructions independently of the standard-hypnotic-induction technique by encouraging Ss to "really feel like you are five years old" within the task-motivation condition.

The retrieval of perceptual responses for the Poggendorff illusion was not as marked as that seen for the Ponzo illusion. The mean obtained for the hypnosis-regressed-to-age-5 group was considerably lower than the normative data for the 5-yr.-olds. While it is evident that the mean for the hypnosis-regressed-to-age-9 condition was similar to the normative data for this group, the Newman-Kuels procedure revealed no significant differences between this condition and the hypnosis-regressed-to-age-5 condition. These results, not seen with the Ponzo illusion, suggest that the induction procedure did not facilitate the retrieval of the perceptual cues for this illusion for age 5 to the same degree that it did for the Ponzo illusion.

A satisfactory explanation of this difference is not obvious. However, it should be pointed out that these illusions are most probably mediated by different mechanisms. For example, it has been hypothesized that the Ponzo illusion is a result of inappropriate constancy scaling and is related directly to the individual's environmental experiences (Filehne, 1898; Gregory, 1963; Tausch, 1954; Von Holst, 1957). A similar explanation does not appear to be appropriate for the Poggendorff illusion.

More importantly, whatever processes of perceptual development are responsible for the observed changes in the magnitude of these illusions as a function of CA, they are apparently not completely irreversible. These results further suggest the possible use of hypnotic age regression as a methodological approach to the study of developmental changes in perception.

## REFERENCES

- BARBER, T. X. Hypnotic age regression: A critical review. *Psychosomatic Medicine*, 1962, **24**, 286-299.
- BARBER, T. X. "Hypnotic" phenomena: A critique of experimental methods. In J. E. Gordon (Ed.), *Handbook of clinical and experimental hypnosis*. New York: Macmillan, 1967.
- BARBER, T. X., & GLASS, C. B. Significant factors in hypnotic behavior. *Journal of Abnormal and Social Psychology*, 1962, **64**, 222-228.
- FILEHNE, W. Die geometrisch-optischen Täuschungen als nachwirkungen der im Körperlichen Sehen erworbenen Erfahrung. *Zeitschrift für Psychologie und Physiologie der Sinnesorgane*, 1898, **17**, 15-61.
- GEBHARD, J. W. Hypnotic age-regression: A review. *American Journal of Clinical Hypnosis*, 1961, **3**, 139-168.
- GIDRO-FRANK, L., & BOWERSBUCH, M. K. A study of the planter response in hypnotic age regression. *Journal of Nervous and Mental Disease*, 1948, **107**, 443-458.
- GREGORY, R. L. Distortion of visual space as inappropriate constancy scaling. *Nature*, 1963, **199**, 678-680.
- HOLST, E. VON. Aktive Leistungen der menschlichen Gesichtswahrnehmung. *Studium Generale*, 1957, **10**, 231-243.
- KUPPER, H. I. Psychic concomitants in wartime injuries. *Psychosomatic Medicine*, 1945, **7**, 15-21.
- LEIBOWITZ, H. W., & GWOZDECKI, J. The magnitude of the Poggendorff illusion as a function of age. *Child Development*, 1967, **38**, 573-580.
- LEIBOWITZ, H. W., & JUDISCH, J. M. The relation between age and the magnitude of the Ponzo illusion. *American Journal of Psychology*, 1967, **80**, 105-109.
- MERCER, M., & GIBSON, R. W. Rorschach content in hypnosis: Chronological age regression. *Journal of Clinical Psychology*, 1950, **6**, 352-358.
- ORNE, M. T. The mechanisms of hypnotic age regression: An experimental study. *Journal of Abnormal and Social Psychology*, 1951, **46**, 213-225.
- TAUSCH, R. Optische Täuschungen als artifizielle Effekte der Gestaltungsprozesse von Grossen- und Formenkonstanz in der natürlichen Raumwahrnehmung. *Psychologische Forschung*, 1954, **24-25**, 299-348.
- TRUE, R. M. Experimental control in hypnotic age regressed states. *Science*, 1949, **110**, 583-584.
- WINER, B. J. *Statistical principles in experimental design*. New York: McGraw-Hill, 1962.
- YATES, A. J. Hypnotic age regression. *Psychological Bulletin*, 1961, **58**, 429-440.

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